



Response To Office Action Summary

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APR 17 2003

Assistant Commissioner for Patents

Washington D.C. 20231

Petition to Patent Examiner, Ruth A. Davis

TECH CENTER 1600/2900

Referring to Office Action Summary date mailed 03/25/2003 regarding patent application serial number 09/888,741, filed by Gene E. Lightner 06/25/2001 response to Office Action is enclosed within, and is referred by numbers within the Office Action Summary.

Claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention are presented within this response to said Office Action Summary.

Accordingly the present invention is both novel and unobvious.

Dependent claims, within the present specification, have been amended and refer to claim 1, and so avoid confusion. Moreover independent claim 1, within the present invention, is amended to clarify the intention of this claim without altering the scope or intention of the application. Objective of amended claim 1 is accordingly apparent.

Prior art, disclosing teachings previously known, is immaterial to the present invention. The object of prior art, as presented by the examiner, is irrelevant to claim 1 within the present invention.

As stated, within said Office Action Summary, claims 1-19 are pending and action is not final.

It is expected that, upon examination of these explanations, all claims will be allowed by the examiner.

A separate clean copy of the claims, (two pages) is included.

Very respectfully,

*Gene E Lightner*

Gene E. Lightner

## Response To Office Action Summary

Petition to patent examiner Ruth A. Davis

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1. Regarding 35 U.S.C. 112 and the quotation from the second paragraph, "The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." Quoting from page 5, line 12-14, within the specification of the present application, "In the preferred embodiment of the present invention, a means of producing water soluble carbohydrates derived from lignocellulose is presented. The water soluble carbohydrates are derived by hydrolysis of cellulose contained in a lignocellulose by enzymes." Moreover claim 1, within the present invention, is amended to clarify the intention of this claim, in the following manner, without altering the scope or intention of the application.

What is claimed is:

1. (amended) A method to produce water soluble carbohydrates from lignocellulose, which comprises:  
providing lignocellulose containing cellulose and  
providing enzymes to said cellulose, and  
providing a membrane to divide a filtrate, and  
combining [the] an extractate, from a previous extraction, containing enzymes, with said lignocellulose [and said enzymes], and  
hydrolyzing said lignocellulose combined with the extractate at a pH of about 5 to produce water soluble carbohydrates and a lignin residue containing water soluble carbohydrates and enzymes, and  
filtering said residue containing lignins from said water soluble carbohydrates and enzymes to produce a filtrate and a filtered residue, and  
extracting the filtered residue containing lignins with water to substantially extract water soluble carbohydrates and enzymes from the residue to produce a water extracted residue and an extractate for recycle, and  
employing said membrane to substantially divide said filtrate containing water soluble carbohydrates and enzymes to provide water soluble carbohydrates substantially devoid of enzymes and provide enzymes for hydrolysis of cellulose contained in said lignocellulose thereby water soluble

carbohydrates substantially devoid of enzymes are formed from lignocellulose and a residue containing lignins substantially devoid of water soluble carbohydrates and enzymes is formed along with enzymes for recycle.

Thus claim 1 is amended to overcome objections of clarity, and provides (, and) rather than enumeration, to clearly specify each step of the method. Dependent claims necessary amendments to clarify the term "said enzyme" have been attained. Accordingly the fact that all enzymes are subjected to recycle and are contained in solution has been established

Regarding claim 1 and the antecedent basis for the term "the extractate," this term is encountered in specification, page 4, line 7.

Concerning claim 5 and claim 7, these claims are examples of Markush groups to define groups within claim 1, and as a group is merely exemplary, as presented within US patent number 6,402,533.

7 (amended) The method of claim 1 wherein [said] enzymes are selected from the group consisting of cellulase, glucanhydrolase and, cellobiohydrolase including an individual or a combination thereof.

13. (amended) The method of claim 1 wherein [said] enzymes derived from ultrafiltration are recycled to provide enzymes to said cellulose contained in a lignocellulose.

With regards to amended claim 7 and 13, the term enzymes refers to the enzymes within claim 1, accordingly misinterpretation is avoided. Furthermore recycle of all enzymes for additional hydrolysis is established.

Relative to claims 10-12 and claim 14-15, the term said water soluble carbohydrates refers to the water soluble carbohydrates within claim 1 and misinterpretation is avoided so that object of the invention is clear, as defined within specification, page 4, lines 2-5, "The present invention in its broadest aspect, establishes a method to produce water soluble carbohydrates by hydrolysis of cellulose contained within a lignocellulose." Moreover within specification, page 5, lines 12-14, " In the preferred embodiment of the present invention, a means of producing water soluble carbohydrates derived from lignocellulose is presented. The water soluble carbohydrates are derived by hydrolysis of cellulose contained in a lignocellulose by enzymes." Accordingly the object of the invention has been spelled out. Recognizing that the term "water soluble carbohydrates" is contained in several recitations within claim 1, claims 10-12 and 14-15 are amended to remove [said].

10. (amended) The method of claim 1 wherein [said] water soluble carbohydrates contain glucose.

11. (amended) The method of claim 1 wherein [said] water soluble carbohydrates contain glucose polymers.

**12. (amended)** The method of claim 1 wherein [said] water soluble carbohydrates contain cellodextrins.

**14. (amended)** The method of claim 1 wherein [said] water soluble carbohydrates containing enzymes are absorbed by cellulose to provide absorbed enzymes for hydrolysis of cellulose contained in a lignocellulose.

**15. (amended)** The method of claim 1 wherein [said] water soluble carbohydrates are subjected to hydrolysis to form glucose.

In regard to claim 13, as amended. The method of claim 1 wherein [said] enzymes derived from ultrafiltration are recycled to provide enzymes to said cellulose contained in a lignocellulose. the term ultrafiltration as defined within specification, page 3, line 17, and "Ultrafiltration Application Bulletin 112 *Organics* 06/04/96." so that the term ultrafiltration has been established. Ultrafiltration, in the invention, is employed to filter high molecular weight enzymes. Accordingly the term ultrafiltration is dependent on claim 1, rather than claim 3.

Relating to confusing nature of the claims, claim 1 has been amended to overcome objections of clarity, and provides (, and) rather than enumeration, of, each step of the method, to claim 1, as previously presented, and contributed within US patent number 6,402,533.

Furthermore, claim 1, as a independent claim, relies on dependent claims for extension of scope within claim 1. Moreover, a quotation of claim 6 " The method of claim 1 wherein said lignocellulose is provided from dilute acid hydrolysis of a biomass to provide a lignocellulose substantially devoid of hemicellulose." represents a method to obtain lignocellulose, and is an option of independent claim 1, to thus avoid claiming this as the only way to acquire lignocellulose.

Therefore lignocellulose can be obtained by any method, including dilute acid hydrolysis

In respect to the interpretation of claim 1, the examiners construction of claims depending on claim 1, within claim 1 is partially correct. It is noticed that dependent claims depending on independent claim 1, have been expanded and lettered, so that an unwanted nature of the dependent claims has been established. Claim 1, as amended previously, establishes the needed steps in order, so a further interpretation of claim 1, is unneeded. Dependent claims, within the present specification, have been amended and refer to claim 1, and so avoid confusion.

3. Regarding 35 U.S.C. 103(a) and the quotation from paragraph (a) "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art

are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art in which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made." 35 U.S.C. 103(a) is thus inapplicable to the present invention.

4. Referring to rejection of claims **1-19**, as being unpatentable, within the present invention. As previously quoted, 5 U.S.C. 103(a), is inapplicable to claims **1-19**, over Toreget et al. (U. S. patent 5,503,996), Chahal U. S. patent (5,047,332) and/or Liaw et al. U. S. patent (6,129,788). Pertaining to the teaching of Toreget, et al. the practice of acidic hydrolysis of biomass to produce lignocellulose is presented. In addition, this teaching specifies removal of hemicellulose from the biomass as water soluble pentoses. Also, this teaching specifies an enzymes for production of glucose from the resulting lignocellulose. The teachings presented above are generally regarded as immaterial to claim **1**, within the present invention. Therefore assertion that claim **1**, within the present invention, is unpatentable is rejected.

Pertaining to the lettered representation of claims **1** as contributed, the steps are represented by amended claim **1**, as previously presented. Referring to several features, applicable to independent claim **1**. These features, found within dependent claims **2-19**, are accordingly dependent on claim **1**.

Referring to the teaching of Toreget, et al. Within the abstract presented, the desired object is pre hydrolysis of a lignocellulose, and immaterial to amended claim **1**, within the present invention, as previously presented. Teachings of Toreget, et al. seem to apply to dependent claims within the present invention. Furthermore, Toreget, et al refers to and, claims prehydrolysis, within claim **1**. Referring to the teachings of Chahal, these teachings are immaterial to claim **1**, within the present invention. Teachings of Chahal seem to apply to dependent claims, within the present invention. Furthermore, Chahal refers to and, claims pretreating biomass, within claim **1** as presented. Referring to the teachings of Liaw, et al., these teachings are immaterial to claim **1**, within the present invention. Teachings of Liaw, et al. seem to apply to dependent claims, within the present invention. Furthermore, Liaw, et al. presents and, claims a liquefied starch solution, within claim **1**.

Concerning this communication from the examiner, an inquiry is unforeseen at this time.